Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A maximum likelihood decoder comprising:

a first probability computing means for computing a logarithm of branch metric (γ), which is a logarithm of probability of a particular branch of a Trellis diagram, computed only based on the knowledge of input and output symbols associated with the particular branch;

a second probability computing means for computing a logarithm of forward state metric (α), which is a logarithm of probability of a particular state of the Trellis diagram, given the probabilities of states at previous time instances;

a third probability computing means for computing a logarithm of backward state metric (β), which is a logarithm of probability of the particular state of the Trellis diagram, given the probabilities of states at future time instances,

wherein each of said second probability computing means and said third probability computing means includes

a path selection means, said path selection means including:

a plurality of comparator circuits to perform comparison operation,

a plurality of selectors to perform selection operation; and

an absolute value selecting means, said absolute value selecting means including:

a plurality of absolute value computation circuits to perform absolute value computation~~operation~~, and

a plurality of selectors to perform selection operation,

wherein comparison operations within the path selecting means and absolute value computation within the absolute value selecting means are carried out concurrently in log likelihood computations, and selection processing operations performed within the path selecting means and absolute value selecting means are carried out concurrently in log likelihood computations, and~~said plurality of selectors configured to enable concurrent operations of comparison, absolute value computation, and selection in log likelihood computations, and~~

wherein said absolute value data selecting means compares said computed absolute value data to determine which is larger on the basis of information on the outcome of comparison obtained by a plurality of said comparator circuits, and

wherein said path selection means operates to generate corrections to said probability of the particular state of the Trellis diagram using at least two paths, one path showing a maximum likelihood and another path showing a second maximum likelihood, from at least three paths in the Trellis diagram; and

a soft-output determining means for determining a log soft-output logarithmically expressing a soft-output in each time slot, given said forward and backward state metrics as well as said branch metric.

2. (Previously Presented) The decoder according to claim 1, wherein each of said plurality of comparator circuits includes

a log likelihood comparator for comparing log likelihood of all combinations of said at least two paths selected from said at least three paths.

3. (Previously Presented) The decoder according to claim 2, wherein each of said plurality of absolute value computation circuits includes

a computation means for computing absolute values of the difference of said at least two paths selected from said at least three paths.

4. (Previously Presented) The decoder according to claim 3, wherein each of said plurality of selectors includes

an absolute value selection means for selecting an absolute value of the difference between data corresponding to a maximum likelihood path and data corresponding to a second maximum likelihood path selected from said at least three paths.

5. (Previously Presented) The decoder according to claim 4, further comprising:

a linear approximation means for computing by linear approximation a correction term added to obtain said log likelihood and expressed by a one-dimensional function relative to a variable, said linear approximation means using said variable as an absolute value of the difference between data corresponding to said maximum likelihood path and fed from said absolute value selection means and data corresponding to said second maximum likelihood path.

6. (Previously Presented) The decoder according to claim 5, wherein said linear approximation means computes said correction term by expressing a coefficient representing the gradient of said one-dimensional function for multiplying said variable at least by means of a power exponent of 2.

7. (Original) The decoder according to claim 6, wherein said linear approximation means discards lower bits of an input data according to the power exponent expressing the coefficient representing the gradient of said function.

8. (Previously Presented) The decoder according to claim 6, wherein said linear approximation means discards bits from the lowest bit to the k-th lowest bit of the input data when the coefficient representing the gradient of said function is expressed by -2^{-k}.

9. (Previously Presented) The decoder according to claim 6, wherein said linear approximation means computes said correction term by expressing the coefficient representing an intercept of said function by means of a power exponent of 2.

10. (Original) The decoder according to claim 9, wherein said linear approximation means computes said correction term by expressing the coefficient representing the intercept of said function by means $2^{m} - 1$.

11. (Previously Presented) The decoder according to claim 10, wherein said linear approximation means discards bits from the lowest bit to the k-th lowest bit of the n-bit input data and inverts m bits from the k+1-th lowest bit to the m+k-th lowest bit when the coefficient representing the gradient of said function is expressed by means of -2^{-k}.

12. (Original) The decoder according to claim 6, wherein said correction term shows a positive value.

13. (Original) The decoder according to claim 12, wherein said linear approximation means makes the correction term equal to 0 when a negative value is produced by computing said correction term.

14-48. (Canceled)

49. (Currently Amended) A ~~maximum likelihood decoding method comprising~~computer program, stored on a tangible recording medium, aimed at maximum likelihood decoding, the program comprising executable instructions that cause a computer to:

first compute ~~computing~~ a logarithm of branch metric (γ), which is a logarithm of probability of a particular branch of a Trellis diagram, computed only based on the knowledge of input and output symbols associated with the particular branch;

second compute ~~computing~~ a logarithm of forward state metric (α), which is a logarithm of probability of a particular state of the Trellis diagram, given the probabilities of states at previous time instances;

third compute ~~computing~~ a logarithm of backward state metric (β), which is a logarithm of probability of the particular state of the Trellis diagram, given the probabilities of states at future time instances,

perform comparison operation, absolute value computation, and selection operation,

wherein comparison operations and absolute value computation are carried out concurrently in log likelihood computations, and selection processing operations are carried out concurrently in log likelihood computations, and

wherein said computed absolute value data is compared to determine which is larger on the basis of information on the outcome of comparison data obtained by said comparison operation, and

~~wherein each of said second computing and said third computing includes comparing, absolute value computing, and selecting to enable concurrent operations of comparison, absolute value computation, and selection in log likelihood computations, and~~

wherein said comparison, absolute value computation, and selection operate to generate corrections to said probability of the particular state of the Trellis diagram using at least two paths, one path showing a maximum likelihood and another path showing a second maximum likelihood, from at least three paths in the Trellis diagram; and

determining a log soft-output logarithmically expressing a soft-output in each time slot, given said forward and backward state metrics as well as said branch metric.

50. (Previously Presented) The method according to claim 49, wherein said comparing includes

comparing log likelihood of all combinations of said at least two paths selected from said at least three paths.

51. (Previously Presented) The method according to claim 50, wherein said absolute value computing includes

computing absolute values of the difference of all combinations of said at least two paths selected from said at least three paths.

52. (Previously Presented) The method according to claim 51, wherein said selecting includes

selecting an absolute value of the difference between data corresponding to a maximum likelihood path and data corresponding to a second maximum likelihood path from said at least three paths.

53. (Previously Presented) The method according to claim 52, further comprising:

computing by linear approximation a correction term added to obtain said log likelihood and expressed by a one-dimensional function relative to a variable; and

using said variable as an absolute value of the difference between data corresponding to said maximum likelihood path and fed from said absolute value selection means and data corresponding to said second maximum likelihood path.

54. (Previously Presented) The method according to claim 53, wherein said computing by linear approximation computes

said correction term by expressing a coefficient representing the gradient of said one-dimensional function for multiplying said variable at least by means of a power exponent of 2.

55. (Previously Presented) The method according to claim 54, wherein said computing by linear approximation discards

lower bits of an input data according to the power exponent expressing the coefficient representing the gradient of said function.

56. (Previously Presented) The method according to claim 54, wherein said computing by linear approximation discards

bits from the lowest bit to the k-th lowest bit of the input data when the coefficient representing the gradient of said function is expressed by -2^{-k}.

57. (Previously Presented) The method according to claim 54, wherein said computing by linear approximation computes

said correction term by expressing the coefficient representing an intercept of said function by means of a power exponent of 2.

58. (Previously Presented) The method according to claim 57, wherein said computing by linear approximation computes

said correction term by expressing the coefficient representing the intercept of said function by means $2^{m} - 1$.

59. (Previously Presented) The method according to claim 58, wherein said computing by linear approximation discards

bits from the lowest bit to the k-th lowest bit of the n-bit input data and inverts m bits from the k+1-th lowest bit to the m+k-th lowest bit when the coefficient representing the gradient of said function is expressed by means of -2^{-k}.

60. (Previously Presented) The method according to claim 54, wherein said correction term shows a positive value.

61. (Previously Presented) The method according to claim 60, wherein said computing by linear approximation makes

the correction term equal to 0 when a negative value is produced by computing said correction term.